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Validation of the 10-item Kessler Psychological Distress Scale (K10) in the 2012 Aboriginal Peoples Survey

by Evelyne Bougie, Rubab G. Arim, Dafna E. Kohen and Leanne C. Findlay

Abstract

Background: The 10-item Kessler Psychological Distress Scale (K10) is a short measure of non-specific psychological distress, which has been shown to be a sensitive screen for the Diagnostic and Statistical Manual of Mental Disorders criteria for anxiety and mood disorders. The scale has yet to be validated as a measure of psychological distress for Aboriginal peoples in Canada.

Data and methods: Using the 2012 Aboriginal Peoples Survey (APS), this study examined the psychometric properties of the K10 for First Nations people living off reserve, Métis, and Inuit aged 15 or older. The factor structure and internal consistency of the K10 were examined via confirmatory factor analysis and Cronbach's alpha, respectively. Descriptive statistics by sex, education, household income, and age group were provided for the scale. K10 construct validity was further assessed by examining associations with mental health variables in the 2012 APS: self-rated mental health, self-reported diagnosed mood and anxiety disorders, and self-reported suicidal ideation in the past 12 months.

Results: A unidimensional "Distress" model with correlated errors was a good fit to the data. Cronbach's alpha values were satisfactory. K10 mean scores were positively skewed, with most respondents reporting few or no distress symptoms. Females and respondents with lower education and household income levels had significantly higher distress. Respondents aged 55 or older had significantly lower distress than their younger counterparts. K10 mean scores were significantly higher for respondents who reported poor mental health, a diagnosed mood disorder, a diagnosed anxiety disorder, or suicidal ideation in the past 12 months. Results were consistent across all three Aboriginal groups.

Interpretation: Based on the 2012 APS, the total score of the K10 appears to be psychometrically sound for use as a broad measure of non-specific psychological distress for First Nations people living off reserve, Métis, and Inuit.

Keywords: Anxiety, depression, First Nations people, indigenous health, Inuit, Métis, mental health, suicide

The 10-item Kessler Psychological Distress Scale (K10) is a short measure of non-specific psychological distress. The K10 has been shown to be a sensitive screen for the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for anxiety and mood disorders in the United States,[1,2] Australia,[3,4] Canada,[5] New Zealand,[6] the Netherlands,[7] and Japan.[8,9] The K10 is frequently used in population health surveys, especially in situations where it is not feasible to include a long diagnostic interview to assess mental disorders.

Information is lacking on the K10's cross-cultural validity among non-Western populations,[7] although findings from a recent study[10] suggest that a shortened version of the K10—the K6—could function as an indicator of possible psychological disorder among a sample of American Indians living on or near their reservations.

The K10 was incorporated as a mental health measure for Aboriginal peoples in the 2012 Aboriginal Peoples Survey (APS). This study examined the validity and reliability of the K10 for First Nations people living off reserve, Métis, and Inuit, based on the 2012 APS. The factor structure and internal consistency of the K10 were evaluated. Because the K10 is meant to be used as a screen for anxiety and depressive disorders, the construct validity of the scale was further assessed by examining associations with self-reports of a diagnosis of anxiety and mood disorders, and with self-rated mental health. The association between the K10 and self-reported suicidal ideation[11,12] was also investigated.

Methods

Data

The 2012 APS is a national survey of Aboriginal peoples (First Nations people living off reserve, Métis, and Inuit) developed by Statistics Canada. The target population consisted of the self-identified Aboriginal population in Canada aged 6 or older and living in private dwellings. At the time of the survey, 80% of off-reserve First Nations people and 74% of Métis resided inside a Census Metropolitan Area or Census Agglomeration; 74% of Inuit resided in one of the four regions collectively known as Inuit Nunangat. People living on Indian reserves and settlements and in certain First Nations communities in Yukon and the Northwest Territories were not included.

More than 50,000 individuals who reported Aboriginal identity or ancestry in the 2011 National Household Survey were sampled. The overall response rate to the 2012 APS was 76%. Data were collected from respondents through computer-assisted telephone or personal interviews. Parental approval was required to directly interview children younger than 18. If parental approval was denied, proxy reports were accepted.

Respondents were interviewed in the official language (English or French) of their choice. For Inuit regions, the questionnaire was translated as a paper copy into Inuktitut (Baffin dialect), and an Inuktitut audio recording of the questionnaire was made to assist interviewers with potential language barriers in the field.

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Sample

The sample for this study consisted of APS non-proxy respondents aged 15 or older with complete K10 data, who reported a single Aboriginal (First Nations, Métis, or Inuit) identity. The K10 was administered only to non-proxy respondents aged 15 or older. For those aged 15 to 17, 58% of First Nations people, 60% of Métis, and 59% of Inuit were non-proxy. Non-proxy percentages for adults aged 18 or older were 93% for First Nations people and Métis and 92% for Inuit. Because of the large percentage of 15- to 17-year-olds to whom the K10 was not administered, chi-square analyses were conducted to determine if the distributions of proxy and non-proxy youth varied by sex, household income, parental education, and presence of a diagnosed mood or anxiety disorder. (The numbers of Inuit youth with diagnosed mood and anxiety disorders were too small to be analyzed.) Alpha level for significance testing was set at 0.01 to adjust for multiple comparisons. Analyses revealed no significant proxy/non-proxy differences (data not shown).

For 5% of First Nations people and Métis and 10% of Inuit respondents, data for the K10 scale were incomplete or missing; these respondents were excluded from all analyses. Inspection of individual K10 items did not reveal any pattern of missing data for particular questions by Aboriginal group. Attrition analyses were performed to compare respondents with complete versus missing K10 data by sex, age, education, household income, and self-rated mental health, again adjusting the alpha level for significance testing at 0.01. Among the subsample with missing K10 data, significantly higher percentages of respondents had less than secondary school graduation, were in the lowest household income tercile, and had poorer self-rated mental health (data not shown).

The final study sample comprised 7,239 First Nations people living off reserve (44% male; mean age 35.6), 6,998 Métis (47% male; mean age 37.0), and 2,852 Inuit (46% male; mean age 33.6) aged 15 or older (Table 1).

Measures

K10 Psychological Distress Scale

The K10 is based on 10 items that measure the frequency of non-specific psychological distress symptoms during the previous month. Respondents were asked, "During the past month, about how often did you feel: 1) tired out for no good reason; 2) nervous; 3) so nervous that nothing could calm you down; 4) hopeless; 5) restless or fidgety; 6) so restless you could not sit still; 7) sad or depressed; 8) so depressed that nothing could cheer you up; 9) everything was an effort; 10) worthless." Items were rated on a five-point ordinal scale—all of the time (score 4), most of the time (score 3), some of the time (score 2), a little of the time (score 1), and none of the time (score 0). Consistent with established guidelines,[1,2] questions 3, 6, and 8 were not asked if the response to the preceding question was "none of the time," and were automatically scored 0. The total K10 score for each respondent was calculated by summing all 10 items. K10 scores could range from 0 to 40, with higher scores indicating higher levels of psychological distress.

Self-rated mental health

Self-rated mental health has a strong and consistent association with many mental morbidity measures.[13] Self-rated mental health was assessed by asking, "In general, would you say your mental health is . . . excellent? very good? good? fair? poor?" Responses were dichotomized as poor/fair/good versus very good/excellent.

Diagnosed chronic conditions

Respondents were asked about "long-term conditions" that had lasted or were expected to last six months or more and that had been diagnosed by a health professional. Two conditions related to mental health were examined: mood disorder (such as depression, bipolar disorder, mania, or dysthymia) (yes/no), and anxiety disorder (such as phobia, obsessive-compulsive disorder, or panic disorder) (yes/no).

Suicidal ideation

Respondents were asked: "Have you ever seriously considered committing suicide or taking your own life?" and "Has this happened in the past 12 months?" A dichotomous (yes/no) variable identified respondents who reported having considered suicide in the past 12 months.

Analyses

The factor structure of the K10 was investigated via confirmatory factor analysis (CFA). The K10 was originally designed as a unidimensional scale to measure non-specific psychological distress related to depression and anxiety.[1] All 10 items were, therefore, hypothesized to serve as indicators of a single "Distress" latent factor. However, as noted previously, three questions in the K10 scale were not asked if the response to the preceding question was "none of the time." To account for the interdependency of these questions and the similarities in item wording,[14] a unidimensional "Distress" factor structure with correlated errors between K10 items that contain a skip

Table 1
Study sample, by Aboriginal identity, sex and age, household population aged 15 or older, Canada, 2012

	Off-reserve First Nations	Métis	Inuit
Total	**7,239**	**6,998**	**2,852**
Sex			
Male	3,184	3,324	1,321
Female	4,055	3,674	1,531
Age			
Mean (standard deviation)	35.6 (15.3)	37.0 (16.1)	33.6 (13.7)
Range	15 to 92	15 to 93	15 to 87

Note: The study sample consists of non-proxy respondents aged 15 or older with complete K10 data, who reported a single Aboriginal identity (First Nations, Métis, or Inuit).
Source: 2012 Aboriginal Peoples Survey.

was identified (Model 1). Because of the ordinal nature of the K10 items, the robust weighted least squares mean and variance adjusted (WLSMV) estimation procedure with polychoric correlations was used. The variance of the hypothesized single factor was fixed to 1,[15] and all parameters were freed. The models were evaluated via three global fit indices: root mean square error of approximation (RMSEA) with corresponding 90% confidence intervals; comparative fit index (CFI); and weighted root mean square residual (WRMR). Good-fitting models have RMSEA values of less than or equal to .06, CFI values of .95 or more,[16] and WRMR values close to 1.0.[17] The large sample sizes in this study precluded the use of the chi-square fit measure.[18] The parameter estimates of all items[19] and the standardized residual matrix[20] were considered to evaluate model fit. Standardized factor loading values were expected to be greater than or equal to .30,[21,22] and standardized residuals for each item to be consistently less than 4.0.[20]

After the factor structure of the K10 was ascertained, the scale's internal consistency was evaluated via Cronbach's alpha. Alpha values of 0.70 to 0.80 are considered satisfactory.[23]

Descriptive statistics by sex, education, household income, and age group for the scale were calculated. Construct validity was further assessed by examining associations with self-rated mental health, self-reported diagnosed anxiety and mood disorders, and past-year suicidal ideation. These associations were examined in a series of ANOVAs using K10 mean scores as the dependent variable. All ANOVAs were performed with p-level set at 0.01 to account for multiple comparisons.

Because of the construct-confirming nature of the CFA, analyses were performed on unweighted data[24] using Mplus Version 7. All other analyses were performed in SAS Version 9.2 using survey weights that account for the complex APS sample design and a bootstrapping technique to calculate estimates of variance. The appropriate multiplicative factor ("Fay adjustment factor") was used to calculate variance, standard error, and coefficient of variation.

Results

Data screening

All K10 items were highly skewed, with a majority of respondents reporting few or no distress symptoms. Multivariate outliers on the items were identified through Mahalanobis distance with

Table 2
K10 inter-item correlations, by Aboriginal identity, household population aged 15 or older, Canada, 2012

Aboriginal identity, K10 item	Tired	Nervous	So nervous cannot calm down	Hopeless	Restless	So restless cannot sit still	Depressed	So depressed cannot cheer up	Everything an effort
Off-reserve First Nations									
Nervous	0.39	1.00	...	...	...	...	...	...	...
So nervous cannot calm down	0.32	0.54	1.00	...	...	...	...	...	...
Hopeless	0.42	0.38	0.42	1.00	...	...	...	...	...
Restless	0.39	0.38	0.34	0.41	1.00	...	...	...	...
So restless cannot sit still	0.34	0.31	0.38	0.39	0.71	1.00	...	...	...
Depressed	0.48	0.47	0.40	0.61	0.44	0.38	1.00	...	...
So depressed cannot cheer up	0.41	0.40	0.48	0.59	0.37	0.40	0.67	1.00	...
Everything an effort	0.43	0.34	0.35	0.46	0.35	0.35	0.48	0.47	1.00
Worthless	0.40	0.38	0.40	0.62	0.36	0.36	0.57	0.62	0.49
Métis									
Nervous	0.39	1.00	...	...	...	...	...	...	...
So nervous cannot calm down	0.32	0.55	1.00	...	...	...	...	...	...
Hopeless	0.41	0.39	0.42	1.00	...	...	...	...	...
Restless	0.36	0.38	0.32	0.35	1.00	...	...	...	...
So restless cannot sit still	0.30	0.33	0.38	0.34	0.70	1.00	...	...	...
Depressed	0.48	0.46	0.39	0.58	0.41	0.35	1.00	...	...
So depressed cannot cheer up	0.37	0.36	0.44	0.59	0.33	0.36	0.64	1.00	...
Everything an effort	0.45	0.35	0.34	0.47	0.35	0.34	0.48	0.46	1.00
Worthless	0.39	0.38	0.40	0.63	0.32	0.34	0.56	0.62	0.49
Inuit									
Nervous	0.39	1.00	...	...	...	...	...	...	...
So nervous cannot calm down	0.29	0.54	1.00	...	...	...	...	...	...
Hopeless	0.36	0.35	0.34	1.00	...	...	...	...	...
Restless	0.36	0.36	0.30	0.38	1.00	...	...	...	...
So restless cannot sit still	0.28	0.32	0.38	0.36	0.67	1.00	...	...	...
Depressed	0.42	0.41	0.32	0.50	0.37	0.32	1.00	...	...
So depressed cannot cheer up	0.32	0.35	0.36	0.47	0.32	0.38	0.62	1.00	...
Everything an effort	0.29	0.26	0.21	0.31	0.28	0.27	0.32	0.29	1.00
Worthless	0.32	0.30	0.33	0.49	0.30	0.32	0.45	0.51	0.32

... not applicable
Note: All Pearson correlations significant at $p < 0.0001$.
Source: 2012 Aboriginal Peoples Survey.

$p < .001$. For First Nations people, 449 cases (6% of the sample) were found to be multivariate outliers. This was also the case for 428 Métis (6% of the sample) and 187 Inuit (7% of the sample).

K10 inter-item correlations

As expected, all K10 items were significantly correlated with each other (Table 2). Among First Nations people and Métis, correlations ranged from around 0.30 to 0.70, and most were under 0.50. Among Inuit, correlations ranged from 0.21 to 0.67, and most were under 0.40. For all groups, the highest inter-item correlations were between the skip-items "restless" and "so restless you could not sit still," and "depressed" and "so depressed that nothing could cheer you up."

Table 3
Confirmatory Factor Analysis fit indices, Model 1, by Aboriginal identity, household population aged 15 or older, Canada, 2012

Aboriginal identity	RMSEA	90% confidence interval from	to	CFI	WRMR
Off-reserve First Nations	0.046	0.042	0.049	0.994	1.7
Métis	0.049	0.046	0.053	0.992	1.9
Inuit	0.046	0.041	0.052	0.990	1.2

Model 1 = K10 unidimensional "Distress" factor structure with correlated errors
RMSEA = root mean square error of approximation
CFI = comparative fit index
WRMR = weighted root mean square residual
Source: 2012 Aboriginal Peoples Survey.

Table 4
K10 mean scores, by Aboriginal identity and selected socioeconomic characteristics, household population aged 15 or older, Canada, 2012

Socioeconomic characteristics	Off-reserve First Nations Mean	SE	F	Métis Mean	SE	F	Inuit Mean	SE	F
Total (range 0 to 40)	6.3	0.17		6.0	0.14		5.5	0.22	
Sex									
Male†	5.3	0.22	128.9***	5.1	0.17	110.5***	4.8	0.26	32.3***
Female	7.1‡	0.22		6.7‡	0.20		6.1‡	0.34	
Age group									
15 to 17	6.6‡	0.37	16.3***	6.3‡	0.43	13.2***	6.2‡	0.44	17.0***
18 to 24	7.1‡	0.34		6.5‡	0.27		7.2‡	0.67	
25 to 34	6.7‡	0.35		6.5‡	0.27		5.2‡	0.30	
35 to 44	6.3‡	0.26		6.4‡	0.32		5.6‡	0.47	
45 to 54	6.8‡	0.59		6.0‡	0.36		5.0	0.46	
55 or older†	5.0	0.35		4.9	0.26		3.8	0.53	
Education (aged 18 or older)									
Less than secondary graduation†	7.7	0.41	42.3***	7.0	0.36	21.9***	5.8	0.30	4.8**
Secondary graduation	5.9‡	0.44		5.6‡	0.31		5.7E	1.21	
At least some postsecondary	5.9‡	0.24		5.7‡	0.17		5.0‡	0.30	
Household income quintile									
1 (lowest)†	8.3	0.39	70.3***	8.3	0.34	89.4***	7.2	0.63	20.0***
2	6.9‡	0.39		6.2‡	0.29		5.1‡	0.34	
3	5.7‡	0.31		5.4‡	0.26		5.3‡	0.39	
4	5.4‡	0.32		4.9‡	0.25		5.2‡	0.46	
5 (highest)	4.6‡	0.23		4.4‡	0.20		4.3‡	0.30	

E use with caution
** $p < 0.01$
*** $p < 0.001$
† reference category
‡ significantly different from reference category within the same identity and characteristic ($p < 0.01$)
SE = standard error
Source: 2012 Aboriginal Peoples Survey.

K10 factor structure and internal consistency

Results from the CFAs indicated very good fit indices for the "correlated error" unidimensional "Distress" model (Model 1, Table 3) for each Aboriginal group. Unstandardized and standardized factor loadings were all significant and above .30, and all standardized residuals were less than 4.0 (data not shown). When CFAs were performed without the multivariate outliers, the goodness-of-fit statistics did not change (data not shown). These analyses suggest that a single-factor structure is a good fit to the K10 data for off-reserve First Nations, Métis, and Inuit APS respondents. The items comprising the K10 showed acceptable internal consistency, with Cronbach's alpha values of 0.88 for First Nations people, 0.87 for Métis, and 0.84 for Inuit.

On the basis of the clinical distinction between depression and anxiety, a two-factor model was also examined, with the "Depression" items (hopeless; depressed; so depressed that nothing could cheer you up; worthless) loading onto one factor and the "Anxiety" items (tired out; nervous; so nervous that nothing could calm you down; restless; so restless you could not sit still; effort) loading on another.[25] The model was run including correlated errors on the skip items. This model provided very good fit to the data, with CFI values of 0.995 for all groups and RMSEA values ranging from 0.034 to 0.04. However, the correlation between the two factors was itself very high at 0.95 for First Nations people, 0.93 for Métis, and 0.91 for Inuit—too high to conclude that a two-factor structure was conceptually more meaningful.

Because the CFA indicated good fit for a two-factor model, a bifactor model was also examined.[26] A bifactor

model identifies a single common latent factor ("Distress"), but allows for multi-dimensionality due to item content clusters (one cluster for "Anxiety" and one for "Depression"). The model was run including correlated errors on the skip items. This model provided very good fit to the data for First Nations people and Métis, with CFI values of 0.997 for both groups and RMSEA values of 0.038 and 0.034, respectively. An examination of the standardized model results confirmed that the factor loadings for Factor 3 ("Distress") were systematically higher (range 0.61 to 0.86) than the factor loadings for Factor 1 ("Anxiety") (range 0.01 to 0.54) and Factor 2 ("Depression") (range 0.18 to 0.37). Goodness-of-fit statistics for Inuit were initially not generated because the residual covariance matrix was not positive definite. An examination of the standardized model results revealed very low factor loading values for Factor 2 ("Depression"), with one item (worthless) dominating the factor.

Because the original purpose of the K10 was to efficiently measure non-specific psychological distress, and given the very good fit indices for the one-dimensional model, the simpler and more parsimonious one-factor scoring procedure was retained for the remainder of this study.

Table 5
K10 mean score distribution, by Aboriginal identity, household population aged 15 or older, Canada, 2012

	Off-reserve First Nations	Métis	Inuit
K10 mean score	Cumulative %		
0	17.4	19.0	20.7
1	26.8	29.3	31.7
2	37.2	39.8	42.0
3	46.7	47.2	51.2
4	55.2	54.6	58.8
5	60.5	60.7	64.4
6	65.4	66.6	70.0
7	69.4	70.3	73.1
8	73.4	74.1	76.3
9	76.3	77.8	79.3
10	79.2	80.8	82.2
11	81.7	83.2	84.4
12	83.6	85.1	86.3
13	85.1	86.4	87.9
14	86.6	88.4	89.7
15	88.3	89.9	91.7
20	93.8	95.8	96.3
25	97.8	98.1	98.7
30	99.6	99.3	99.8
33	99.8	99.7	100.0
35	99.8	99.9	100.0
36	99.9	99.9	100.0
37	100.0	100.0	100.0

Source: 2012 Aboriginal Peoples Survey.

Table 6
K10 mean scores, by Aboriginal identity and mental health covariates, household population aged 15 or older, Canada, 2012

	Off-reserve First Nations			Métis			Inuit		
Mental health covariates	Mean	SE	F	Mean	SE	F	Mean	SE	F
Self-rated mental health									
Very good/Excellent	3.5	0.09	2491.1 ***	3.5	0.10	2362.2 ***	3.8	0.20	284.4 ***
Poor/Fair/Good	10.6	0.29		10.4	0.26		7.5	0.37	
Diagnosed mood disorder									
No	4.7	0.12	3162.7 ***	4.7	0.12	2697.3 ***	4.7	0.21	697.2 ***
Yes	15.4	0.49		15.2	0.44		15.1	0.82	
Diagnosed anxiety disorder									
No	5.0	0.14	2141.5 ***	4.8	0.12	1940.5 ***	5.1	0.23	192.2 ***
Yes	14.4	0.47		13.8	0.45		11.6	1.13	
Considered suicide in past 12 months									
No	5.6	0.13	1771.2 ***	5.5	0.14	973.4 ***	5.0	0.23	293.0 ***
Yes	19.0	0.68		17.2	0.80		13.2	0.94	

SE = standard error
*** $p < 0.001$
Source: 2012 Aboriginal Peoples Survey.

K10 descriptives

The mean K10 score (range 0 to 40) was 6.3 (SE = 0.17) for First Nations people living off reserve, 6.0 (SE = 0.14) for Métis, and 5.5 (SE = 0.22) for Inuit (Table 4). ANOVAs indicated that in each Aboriginal group, females had significantly higher distress scores than males. In addition, respondents without secondary school graduation and those in the lowest household income quintile reported significantly higher distress than their counterparts with higher education and income. First Nations people and Métis aged 55 or older displayed significantly lower distress than their younger counterparts. Inuit aged 55 or older reported significantly lower distress than all other age groups except 45 to 54. In addition, Inuit aged 18 to 24 reported significantly higher distress than all other age groups except 15 to 17. Because of the extreme skewness and kurtosis of K10 scores, ANOVAs were also performed using logarithmically transformed scores—results were the same (data not shown).

Mean K10 scores were highly skewed, with 20% of respondents (lowest quintile) reporting a total distress score of zero (Table 5). Another 20% of Inuit reported a distress score of 1, while for First Nations people and Métis, the second quintile included scores of 1 or

2. The third quintile included scores of 2 through 4 for Inuit, and 3 or 4 for First Nations people and Métis. The fourth quintile included scores of 5 through 9 for Inuit and Métis, and 5 through 10 for First Nations people. The top quintile of the distribution corresponded to scores of 10 or more for Inuit and Métis, and 11 or more for First Nations people.

K10 associations with mental health covariates

ANOVAs indicated that First Nations people living off reserve, Métis, and Inuit who reported poor/fair/good mental health had significantly higher distress scores than those who reported very good/excellent mental health (Table 6). As well, respondents with diagnosed mood or anxiety disorders had significantly higher distress scores than those without these conditions. Finally, respondents who had considered suicide in the past 12 months had significantly higher distress scores than those who had not. Results were consistent across all three Aboriginal groups. Results of ANOVAs performed using logarithmically transformed K10 scores were the same (data not shown).

Discussion

This study examined the psychometric properties of the K10 in the 2012 APS. Findings suggest that the K10 is a valid and reliable instrument to measure non-specific psychological distress among First Nations people living off reserve, Métis, and Inuit.

Specifically, this study found support for the hypothesized unidimensional nature of the K10.[1] A "correlated error" unidimensional "Distress" model was a good fit to the data for the three Aboriginal groups. Cronbach's alpha values for the K10 were also more than satisfactory. A two-factor model, while providing good fit to the data, showed correlations between Anxiety and Depression that were too high to conclude two conceptually distinct constructs. A bifactor model provided good fit to the data for a single factor while controlling for the effects of multi-dimensionality caused by item content clusters. Together, these results lead to the recommendation to use the K10 as a single factor score in the 2012 APS.

Consistent with other population-based studies,[2,3] this analysis showed positively skewed K10 mean scores, with most APS respondents reporting few or no distress symptoms. The top quintile of the distribution corresponded to scores of 10 or more for Inuit and Métis and 11 or more for First Nations people living off reserve—in line with research that showed an upper quintile cut-off score of 9 among Canadian Community Health Survey respondents overall.[27]

Similar to findings from other population-based research,[6,27,28] female APS respondents and respondents with lower education and household income levels displayed significantly higher distress. Respondents aged 55 or older reported significantly lower distress than their younger counterparts. Inuit aged 18 to 24 displayed significantly higher distress than their older counterparts.

Lastly, and in line with extensive research that has shown the K10 to be a sensitive screen for DSM-IV criteria for anxiety and mood disorders,[1-7] K10 mean scores were significantly higher for respondents who reported a diagnosed mood or anxiety disorder or past-year suicidal ideation, a finding that has been reported by others.[11,12] These results were consistent across all three Aboriginal groups.

Limitations

One limitation of this study is that the question of how the K10 relates to a clinical mental health diagnosis could not be investigated. The absence of a standardized diagnostic instrument in the 2012 APS—such as the WHO Composite International Diagnostic Interview (CIDI)—precluded examination of the ability of the K10 to discriminate cases and non-cases of DSM-IV disorders. K10 construct validity as a broad indicator of possible psychological distress could be examined only with measures included on the survey, which were limited by their dichotomous (yes/ no) and self-reported nature. The absence of a standardized diagnostic instrument in the APS further precluded validation of scoring rules for the K10 to generate predicted probabilities of various clinically significant mental health outcomes.

Another limitation is that K10 scores were calculated only for respondents with complete data on all 10 items; this resulted in a loss of 5% to 10% of the initial study sample. Attrition analyses suggest that the analytic sample could be biased toward respondents with higher education and household income, and those with better self-rated mental health. A systematic pattern of missing data may also exist for those with high distress. The K10 was not developed specifically for Aboriginal peoples—missing K10 data could reflect

What is already known on this subject?

- The 10-item Kessler Psychological Distress Scale (K10) is a short measure of non-specific psychological distress that is frequently used in population health surveys.
- The K10 was incorporated as a mental health measure in the 2012 Aboriginal Peoples Survey (APS).
- The K10 scale has not been validated as a measure of psychological distress for Aboriginal peoples in Canada.

What does this study add?

- This is the first study to validate the K10 scale for First Nations people living off reserve, Métis, and Inuit in Canada.
- The analysis supports the K10 as a psychometrically valid and reliable instrument to measure non-specific psychological distress among these three Aboriginal groups.

problematic concepts or item wording for this population.

In the 2012 APS, the K10 was translated into French and Inuktitut, but the impact of language of administration could not be examined, owing to the absence of a "language of interview" flag on the dataset. Consequently, the validity and reliability of the K10 for different language groups could not be investigated. Some languages may lack conceptual equivalents for English mental health constructs[29]; there could also be cultural differences in symptom expression.[30]

The present analysis validates the K10 only among First Nations people living off reserve, Métis, and Inuit based on the 2012 APS. Findings should not be interpreted to mean that the factorial structure and item parameters of the K10 are invariant across cultures or that the K10 items are interpreted the same way by First Nations people, Métis, Inuit, and the general Canadian population. Additional research, including qualitative studies, would contribute to understanding of "the most appropriate idioms of distress"[29] for Aboriginal peoples in Canada, and provide information on the cultural validity of the K10.

Future research could also include measurement invariance analyses of the K10 factor structure across sex and education and income levels within each Aboriginal group. For instance, it is not known whether the higher K10 mean scores among women relative to men are due to a real sex difference or to differences in how women and men perceive and express psychological distress.[31] Invariance analyses were not performed before mean scores across different socio-demographic groups were compared, which is another limitation of the present study.

Lastly, the 2012 APS excluded people living on Indian reserves and settlements and in certain First Nations communities in Yukon and the Northwest Territories. Findings from this study cannot be generalized to the on-reserve population.

Conclusion

This study is the first to validate the K10 scale for Aboriginal peoples in Canada. The K10 scale appears to be psychometrically appropriate for use as a single score and a broad measure of non-specific psychological distress for First Nations people living off reserve, Métis, and Inuit based on the 2012 APS. However, more research is needed to validate the K10 using a standardized diagnostic instrument. Examination of the cultural validity of the K10 and of the construct validity of the scale using clinically meaningful mental health outcomes for Aboriginal peoples in Canada is also warranted. ■

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